The Cationic Peptide CM11 Can Improve the Efficiency of Plasmid Transformation Into Escherichia coli and Bacillus subtilis

Mohammad Heiat[1]; Mehrdad Moosazadeh Moghaddam*[1]; Hossein Aghamollaei[1]; Hamid Kooshki[2]

1-Applied Biotechnology Research Center, Bqiyatallah University of Medical Sciences, Tehran, Iran
2-Nanobiotechnology Research Center, Baqiyatallah University of Medical Sciences, Tehran, Iran

mohamad.heiat@gmail.com

Background & Objectives: Transformation efficiency of DNA into host cells as an important stage in microbial biotechnology is a measure of the amount of cells in which the bacterial cells uptake DNA molecules or form colony unit (cfu)/µg DNA. Use of cold calcium chloride is one of the most practical and cheapest Methods to transform DNA plasmid into gram negative bacteria such as E. coli with efficiency of 105-107 colonies/µg DNA. Also some gram positive bacteria such as B. subtilis are transferred with DNA plasmid using a natural manner. This study reports the increase of transformation efficiency by use of cationic peptide as a novel and efficient membrane penetrating agent to transport various DNA plasmids into gram negative and positive bacterial hosts.

Methods: After synthesis of the hybrid peptide CM11 (WKLFKKILKVL-NH2) and preparation of *E. coli* competent cells and *B. subtilis*, two different types of plasmids pET-28a(+), pGEX4T-1 were transferred into *E. coli* and *B. subtilis* was transferred by pWB980. Calcium chloride treated *E. coli* competent cells were prepared in presence of different concentration of peptide on different time and mix with adequate amount of plasmids. Then transformation was done by 2 min, 42˚C heat shock. In the case of *B. subtilis* natural spontaneous DNA transformation accompanied with presence of different concentration peptide.

Results: Results showed that the uptake of pET-28a (+) and pGEX4T-1 plasmid into *E. coli* increased 4.7 and 4.6 fold respectively greater than conventional condition. Also the entry of pWB98 plasmid into *B. subtilis* efficiently improved which it was 6.4 fold higher than basal conditions.

Conclusion: These studies showed that CM11 cationic peptide as a cell permeable peptide can increase the plasmid transformation efficiency in bacteria cells. So these results can be used as initial and basal data for some more studies on these types of peptides in order to further increase transformation efficiency in bacteria.

Keywords: Cell Permeable Peptide; Transformation Efficiency; CaCl2 Methods; DNA Plasmid